MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2016/2017

BSA1024 – STATISTICS

(All sections / Groups)

07 MARCH 2017
2.30 p.m. – 4.30 p.m.
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This question paper consists of **13** pages excluding the cover page.
2. This question paper has two sections. **Section A** consists of 10 multiple choice questions and **Section B** consists of 3 structured questions.
3. Attempt ALL questions.
4. For **Section A**, record all your answers on the OMR sheet provided.
   For **section B**, write your answers in the Answer Booklet provided.
5. The statistical formula and tables are attached at the end of this question paper.

SECTION A: MULTIPLE CHOICE QUESTIONS [20 marks]

Each question is worth 2 marks. Record all your answers in the OMR sheet provided.

1. A magazine publisher mails a survey to every subscriber asking about the quality of its subscription service. What does the total number of subscribers represent?

   A. The sample.
   B. The statistic.
   C. The parameter.
   D. The population.

2. What is the distribution of a sample data with a mean of 65 and a median of 60?

   A. The distribution of the data is neither skewed nor symmetric.
   B. The data has a symmetric distribution.
   C. The data has a left-skewed distribution.
   D. The data has a right-skewed distribution.

3. Which of the following statement is FALSE?

   A. The mode is the value that occurs most often in a data set.
   B. The larger the dispersion, the larger the standard deviation.
   C. The distribution of a data is skewed if its mean and median are equal.
   D. Higher percentage of CV indicates higher volatility of the data compared to another data.

4. Which of the following measure is not sensitive to extreme values?

   A. The mean.
   B. The standard deviation.
   C. The interquartile range.
   D. The range.

5. Which of the following is TRUE about the correlation coefficient?

   A. Its value ranges from 0 to 1.
   B. Its value ranges from – 1 to + 1.
   C. The value of 0 indicates that the variables are correlated.
   D. The value of 1 indicates that the variables are unrelated.

Continued...

6. Which of the following statement is FALSE?

   A. The examination grades (A to F) are an example of ordinal scale measurement.
   B. The research will be able to conclude about the population based on a sample if he uses descriptive statistics.
   C. Primary data is the specific information collected by the person who is doing the investigation.
   D. Marital status is an example of a qualitative data.

7. Each month the Immigration Department had arrested an average of 250 illegal immigrants. Assuming that the number of monthly arrests are independent, what is the expected number of illegal immigrants arrested per year?

   A. 3,000
   B. 250
   C. 7,500
   D. 20

8. The monthly income of trainees at a local mill are normally distributed with a mean of $1,100 and a standard deviation of $150. What percentage of trainees earn less than $900 a month?

   A. 9.18%
   B. 90.82%
   C. 35.31%
   D. 40.82%

9. Assume that the mean hourly cost to operate a commercial airplane follows the normal distribution with a mean of $210 per hour and a standard deviation of $25. What is the operating cost for the lowest 3 percent of airplanes?

   A. $235
   B. $163
   C. $257
   D. $185

10. The following statements are the purpose of index numbers EXCEPT

    A. Index numbers is used to deflate time series data to reflect reality.
    B. Index numbers can be used to conclude the purchasing power of a currency.
    C. Index numbers is used to measure the central location of a data series.
    D. Index numbers can be used a guide for policy making.

Continued...

SECTION B: STRUCTURED QUESTIONS [80 marks]

Write your answers in the Answer Booklet provided. Show all necessary workings.

Question 1 (20 marks)

(a) The following data give the annual expenditures (in thousands of Euros) for a sample of 10 individuals. The data are ordered for convenience.

56 59 60 68 74 78 84 97 107 382

(i) Compute the interquartile range. (3 marks)

(ii) Does this data set contain any outlier(s)? Justify your answer. (5 marks)

(b) A random sample of 25 people employed by the Economic Planning Unit (EPU) earned an average monthly wage of RM 6500. The sample standard deviation was RM 625.

(i) Develop a 99% confidence interval for the population mean monthly wage for these employees.

(5 marks)

(ii) Suppose the EPU claimed that the mean monthly wage for all employees is greater than RM 6000. Test this claim at $\alpha = 0.05$.

(7 marks)

Question 2 (30 marks)

(a) An analyst estimates that probability that the economy will experience a recession in the next 12 months is 25%. He also believes that if the economy encounters a recession, the probability that his mutual fund will increase in value is 20%. If there is no recession, the probability that the mutual fund will increase in values is 75%.

(i) Draw a tree diagram for the problem above. Show all probabilities at all branches.

(4 marks)

(ii) Find the probability that the mutual fund's value will increase.

(4 marks)

Continued...

(b) Twenty corporations were asked whether or not they provide retirement benefits to their employees. Fourteen of the corporations said they do provide retirement benefits to their employees. If five corporations are randomly selected, find the probability that

(i) exactly 2 of them provide retirement benefits. (4 marks)

(ii) at most one of them provides retirement benefits. (5 marks)

(c) A recent survey found that 32% of social network users use the same password for all their social networking sites. Determine the sample size needed to estimate the population proportion with 95% confidence to within ±0.03.

(4 marks)

(d) According to an estimate, the average earnings of female workers who are non-union members are \$388 per week and those of female workers who are union members are \$505 per week. Suppose that these average earnings are calculated based on random samples of 1500 female workers who are non-union members and 2000 female workers who are union members. The standard deviations for the two populations are \$30 and \$35, respectively.

Is there evidence to conclude the mean weekly earnings of all female workers who are non-union members are less than those of female workers who are union members? Use $\alpha = 0.025$

(9 marks)

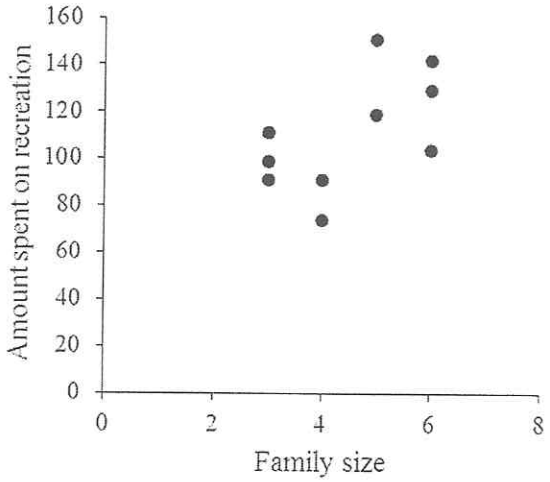
Question 3 (30 marks)

(a) A sample of 10 families in a small district revealed the following data for family size and the amount spent on recreation per week.

Family size	Amount spent on recreation (\$)	Family size	Amount spent on recreation (\$)
3	99	3	111
6	104	4	74
5	151	4	91
6	129	5	119
6	142	3	91

Continued...

A researcher wants to find out the relationship between the two variables. The results of his analysis are as follows:



Regression output

Regression Statistics	
Multiple R	0.5892
R Square	0.3471
Standard Error	20.8186
Observations	10

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	60.359	25.468	2.370	0.045
Family size	11.276	5.467	2.062	0.073

(i) Based on the scatterplot, what conclusion can be made about the relationship between family size and the amount spent on recreation? (1 mark)

(ii) Determine the correlation coefficient and interpret its meaning. (2 marks)

(iii) Determine the coefficient of determination and interpret its meaning. (2 marks)

(iv) State the estimated linear regression equation. (2 marks)

(v) Interpret the slope of the estimated regression equation. (2 marks)

Continued...

(vi) Does the predictor (family size) provide a significance contribution to the model? Use the 5% significant level.

(4 marks)

(vii) Predict the amount spent on recreation if the family size is 8. Is the prediction reliable? Justify your answer.

(4 marks)

(b) H&E, a home and electrical appliance company, produces three major lines of products: top, middle and economy. Last year, the company significantly revamped its pricing policy for the three lines. The following data provide information on average selling price and sales volume for the last 2-year period:

	Average Selling Price		Sales (thousands of products)	
Line	2014	2015	2014	2015
Top	RM 14.00	RM 17.00	22.7	22.8
Middle	RM 8.00	RM 10.00	29.7	35.6
Economy	RM 3.29	RM 3.99	44.6	45.1

Construct the Laspeyres Price and Quantity Indices using 2014 as the base year. Then, interpret your answers.

(13 marks)

End of Question Page.

APPENDIX

STATISTICAL FORMULA

A. DESCRIPTIVE STATISTICS

Mean: $\overline{X} = \dfrac{\sum_{i=1}^{n} X_i}{n}$

Standard deviation: $s = \sqrt{\dfrac{\sum_{i=1}^{n} X^2}{n-1} - \dfrac{\left(\sum_{i=1}^{n} X_i\right)^2}{n(n-1)}}$

Coefficient of Variation: $CV = \dfrac{s}{\overline{X}} \times 100\%$

Pearson's Coefficient of Skewness: $S_k = \dfrac{3(\overline{X} - Median)}{s}$

B. PROBABILITY

Basic Probability Rules

$P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$P(A \cap B) = P(A) \cdot P(B)$ if A and B are independent

$P(A \mid B) = P(A \cap B) \div P(B)$

Binomial Probability Distribution

If X follows a Binomial distribution, B(n, p) where $P(X = x) = {}^{n}C_{x} p^{x} q^{n-x}$

then the mean = $E(X) = np$ and variance = $VaR(X) = npq$ where $q = 1 - p$

Poisson Probability Distribution

If X follows a Poisson distribution, Po(λ) where $P(X = x) = \dfrac{e^{-\lambda} \lambda^{x}}{x!}$

then the mean = $E(X) = \lambda$ and variance = $VaR(X) = \lambda$

Normal Probability Distribution

If X follows a Normal distribution, N(μ, σ) where the mean = $E(X) = \mu$ and variance = $VaR(X) = \sigma^2$ then $Z = \dfrac{X - \mu}{\sigma}$

C. CONFIDENCE INTERVAL ESTIMATION AND SAMPLE SIZE DETERMINATION

$(100-\alpha)\%$ confidence interval for population mean (σ known): $\overline{X} \pm Z_{\alpha/2}\left(\frac{\sigma}{\sqrt{n}}\right)$ $(100-\alpha)\%$ confidence interval for population mean (σ unknown): $\overline{X} \pm t_{\alpha/2,n-1}\left(\frac{s}{\sqrt{n}}\right)$ $(100-\alpha)\%$ confidence interval for population proportion: $p \pm Z_{\alpha/2}\sqrt{\frac{p(1-p)}{n}}$
Sample size determination for population mean: $n \geq \frac{(Z_{\alpha/2})^2 \sigma^2}{E^2}$ Sample size determination for population proportion: $n \geq \frac{(Z_{\alpha/2})^2 p(1-p)}{E^2}$ Where E = limit of error in estimation

D. HYPOTHESIS TESTING

One sample mean test:	
Standard deviation σ known $Z = \frac{\overline{X} - \mu}{\sigma/\sqrt{n}}$	Standard deviation σ unknown $t = \frac{\overline{X} - \mu}{s/\sqrt{n}}$
One sample proportion test: $Z = \frac{p - \pi}{\sqrt{\frac{\pi(1-\pi)}{n}}}$	
Two sample mean test:	
Standard deviation σ known $Z = \frac{\overline{X}_1 - \overline{X}_2}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}}$	Standard deviation σ unknown $t = \frac{\overline{X}_1 - \overline{X}_2}{\sqrt{S_p^2\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$ where $S_p^2 = \frac{(n_1-1)S_1^2 + (n_2-1)S_2^2}{(n_1-1)+(n_2-1)}$
Two sample proportion test: $Z = \frac{p_1 - p_2}{\sqrt{p(1-p)\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$ where $p = \frac{n_1 p_1 + n_2 p_2}{n_1 + n_2} = \frac{X_1 + X_2}{n_1 + n_2}$	

E. REGRESSION ANALYSIS

Correlation coefficient:

$$r = \frac{\sum XY - \left[\frac{\sum X \sum Y}{n}\right]}{\sqrt{\left[\sum X^2 - \frac{(\sum X)^2}{n}\right]\left[\sum Y^2 - \frac{(\sum Y)^2}{n}\right]}} = \frac{COV(X,Y)}{\sigma_X \sigma_Y}$$

Simple linear regression:

Population model: $Y = \beta_0 + \beta_1 X_1 + \varepsilon$

Sample model: $\hat{y} = b_0 + b_1 X_1 + e$

ANOVA table for linear regression:

Source	Degrees of freedom	Sum of squares	Mean squares
Regression	p	SSR	MSR = SSR/p
Error	$n-p-1$	SSE	MSE = SSE/$(n-p-1)$
Total	$n-1$	SST	

Test statistic for significance of the overall regression model: $F = MSR / MSE$

Test statistics for significance of the predictor variable

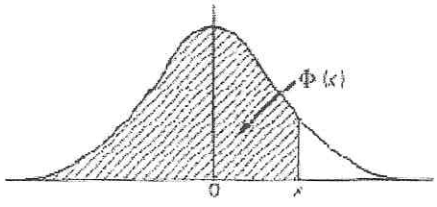
$t_i = \frac{b_1 - \beta_1}{S_{b_i}}$ and the critical value = $\pm t_{\alpha/2, n-p-1}$

F. INDEX NUMBERS

Simple price index $P = \frac{p_t}{p_0} \times 100$	Laspeyres quantity index $P = \frac{\sum p_0 q_t}{\sum p_0 q_0} \times 100$
Aggregate price index $P = \frac{\sum p_t}{\sum p_0} \times 100$	Paasche quantity index $P = \frac{\sum p_t q_t}{\sum p_t q_0} \times 100$
Laspeyres price index (LPI) $P = \frac{\sum p_t q_0}{\sum p_0 q_0} \times 100$	Fisher's ideal price index $F = \sqrt{LPI \times PPI}$
Paasche price index (PPI) $P = \frac{\sum p_t q_t}{\sum p_0 q_t} \times 100$	Value index $V = \frac{\sum p_t q_t}{\sum p_0 q_0} \times 100$

TABLE 4. THE NORMAL DISTRIBUTION FUNCTION

The function tabulated is $\Phi(x) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{x} e^{-\frac{1}{2}t^2}\, dt$. $\Phi(x)$ is the probability that a random variable, normally distributed with zero mean and unit variance, will be less than or equal to x. When $x < 0$ use $\Phi(x) = 1 - \Phi(-x)$, as the normal distribution with zero mean and unit variance is symmetric about zero.



x	$\Phi(x)$	x	$\Phi(x)$	x	$\Phi(x)$	x	$\Phi(x)$	x	$\Phi(x)$	x	$\Phi(x)$
0·00	0·5000	0·40	0·6554	0·80	0·7881	1·20	0·8849	1·60	0·9452	2·00	0·97725
·01	·5040	·41	·6591	·81	·7910	·21	·8869	·61	·9463	·01	·97778
·02	·5080	·42	·6628	·82	·7939	·22	·8888	·62	·9474	·02	·97831
·03	·5120	·43	·6664	·83	·7967	·23	·8907	·63	·9484	·03	·97882
·04	·5160	·44	·6700	·84	·7995	·24	·8925	·64	·9495	·04	·97932
0·05	0·5199	0·45	0·6736	0·85	0·8023	1·25	0·8944	1·65	0·9505	2·05	0·97982
·06	·5239	·46	·6772	·86	·8051	·26	·8962	·66	·9515	·06	·98030
·07	·5279	·47	·6808	·87	·8078	·27	·8980	·67	·9525	·07	·98077
·08	·5319	·48	·6844	·88	·8106	·28	·8997	·68	·9535	·08	·98124
·09	·5359	·49	·6879	·89	·8133	·29	·9015	·69	·9545	·09	·98169
0·10	0·5398	0·50	0·6915	0·90	0·8159	1·30	0·9032	1·70	0·9554	2·10	0·98214
·11	·5438	·51	·6950	·91	·8186	·31	·9049	·71	·9564	·11	·98257
·12	·5478	·52	·6985	·92	·8212	·32	·9066	·72	·9573	·12	·98300
·13	·5517	·53	·7019	·93	·8238	·33	·9082	·73	·9582	·13	·98341
·14	·5557	·54	·7054	·94	·8264	·34	·9099	·74	·9591	·14	·98382
0·15	0·5596	0·55	0·7088	0·95	0·8289	1·35	0·9115	1·75	0·9599	2·15	0·98422
·16	·5636	·56	·7123	·96	·8315	·36	·9131	·76	·9608	·16	·98461
·17	·5675	·57	·7157	·97	·8340	·37	·9147	·77	·9616	·17	·98500
·18	·5714	·58	·7190	·98	·8365	·38	·9162	·78	·9625	·18	·98537
·19	·5753	·59	·7224	·99	·8389	·39	·9177	·79	·9633	·19	·98574
0·20	0·5793	0·60	0·7257	1·00	0·8413	1·40	0·9192	1·80	0·9641	2·20	0·98610
·21	·5832	·61	·7291	·01	·8438	·41	·9207	·81	·9649	·21	·98645
·22	·5871	·62	·7324	·02	·8461	·42	·9222	·82	·9656	·22	·98679
·23	·5910	·63	·7357	·03	·8485	·43	·9236	·83	·9664	·23	·98713
·24	·5948	·64	·7389	·04	·8508	·44	·9251	·84	·9671	·24	·98745
0·25	0·5987	0·65	0·7422	1·05	0·8531	1·45	0·9265	1·85	0·9678	2·25	0·98778
·26	·6026	·66	·7454	·06	·8554	·46	·9279	·86	·9686	·26	·98809
·27	·6064	·67	·7486	·07	·8577	·47	·9292	·87	·9693	·27	·98840
·28	·6103	·68	·7517	·08	·8599	·48	·9306	·88	·9699	·28	·98870
·29	·6141	·69	·7549	·09	·8621	·49	·9319	·89	·9706	·29	·98899
0·30	0·6179	0·70	0·7580	1·10	0·8643	1·50	0·9332	1·90	0·9713	2·30	0·98928
·31	·6217	·71	·7611	·11	·8665	·51	·9345	·91	·9719	·31	·98956
·32	·6255	·72	·7642	·12	·8686	·52	·9357	·92	·9726	·32	·98983
·33	·6293	·73	·7673	·13	·8708	·53	·9370	·93	·9732	·33	·99010
·34	·6331	·74	·7704	·14	·8729	·54	·9382	·94	·9738	·34	·99036
0·35	0·6368	0·75	0·7734	1·15	0·8749	1·55	0·9394	1·95	0·9744	2·35	0·99061
·36	·6406	·76	·7764	·16	·8770	·56	·9406	·96	·9750	·36	·99086
·37	·6443	·77	·7794	·17	·8790	·57	·9418	·97	·9756	·37	·99111
·38	·6480	·78	·7823	·18	·8810	·58	·9429	·98	·9761	·38	·99134
·39	·6517	·79	·7852	·19	·8830	·59	·9441	·99	·9767	·39	·99158
0·40	0·6554	0·80	0·7881	1·20	0·8849	1·60	0·9452	2·00	0·9772	2·40	0·99180

Continued...

x	$\Phi(x)$	x	$\Phi(x)$	x	$\Phi(x)$	x	$\Phi(x)$	x	$\Phi(x)$	x	$\Phi(x)$
2·40	0·99180	2·55	0·99461	2·70	0·99653	2·85	0·99781	3·00	0·99865	3·15	0·99918
·41	·99202	·56	·99477	·71	·99664	·86	·99788	·01	·99869	·16	·99921
·42	·99224	·57	·99492	·72	·99674	·87	·99795	·02	·99874	·17	·99924
·43	·99245	·58	·99506	·73	·99683	·88	·99801	·03	·99878	·18	·99926
·44	·99266	·59	·99520	·74	·99693	·89	·99807	·04	·99882	·19	·99929
2·45	0·99286	2·60	0·99534	2·75	0·99702	2·90	0·99813	3·05	0·99886	3·20	0·99931
·46	·99305	·61	·99547	·76	·99711	·91	·99819	·06	·99889	·21	·99934
·47	·99324	·62	·99560	·77	·99720	·92	·99825	·07	·99893	·22	·99936
·48	·99343	·63	·99573	·78	·99728	·93	·99831	·08	·99896	·23	·99938
·49	·99361	·64	·99585	·79	·99736	·94	·99836	·09	·99900	·24	·99940
2·50	0·99379	2·65	0·99598	2·80	0·99744	2·95	0·99841	3·10	0·99903	3·25	0·99942
·51	·99396	·66	·99609	·81	·99752	·96	·99846	·11	·99906	·26	·99944
·52	·99413	·67	·99621	·82	·99760	·97	·99851	·12	·99910	·27	·99946
·53	·99430	·68	·99632	·83	·99767	·98	·99856	·13	·99913	·28	·99948
·54	·99446	·69	·99643	·84	·99774	·99	·99861	·14	·99916	·29	·99950
2·55	0·99461	2·70	0·99653	2·85	0·99781	3·00	0·99865	3·15	0·99918	3·30	0·99952

The critical table below gives on the left the range of values of x for which $\Phi(x)$ takes the value on the right, correct to the last figure given; in critical cases, take the upper of the two values of $\Phi(x)$ indicated.

3·075	0·9990	3·263	0·9994	3·731	0·99990	3·916	0·99995
3·105	0·9991	3·320	0·9995	3·759	0·99991	3·976	0·99996
3·138	0·9992	3·389	0·9996	3·791	0·99992	4·055	0·99997
3·174	0·9993	3·480	0·9997	3·826	0·99993	4·173	0·99998
3·215	0·9994	3·615	0·9998	3·867	0·99994	4·417	0·99999
			0·9999		0·99995		1·00000

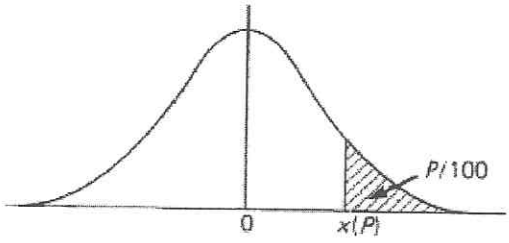
When $x > 3{\cdot}3$ the formula $1-\Phi(x) \doteqdot \frac{e^{-\frac{1}{2}x^2}}{x\sqrt{2\pi}}\left[1-\frac{1}{x^2}+\frac{3}{x^4}-\frac{15}{x^6}+\frac{105}{x^8}\right]$ is very accurate, with relative error less than $945/x^{10}$.

TABLE 5. PERCENTAGE POINTS OF THE NORMAL DISTRIBUTION

This table gives percentage points $x(P)$ defined by the equation

$$\frac{P}{100} = \frac{1}{\sqrt{2\pi}} \int_{x(P)}^{\infty} e^{-\frac{1}{2}t^2}\, dt.$$

If X is a variable, normally distributed with zero mean and unit variance, $P/100$ is the probability that $X \geqslant x(P)$. The lower P per cent points are given by symmetry as $-x(P)$, and the probability that $|X| \geqslant x(P)$ is $2P/100$.



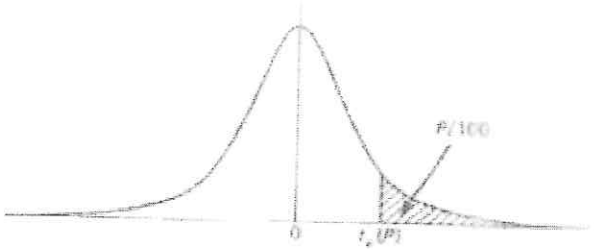
P	$x(P)$	P	$x(P)$	P	$x(P)$	P	$x(P)$	P	$x(P)$	P	$x(P)$
50	0·0000	5·0	1·6449	3·0	1·8808	2·0	2·0537	1·0	2·3263	0·10	3·0902
45	0·1257	4·8	1·6646	2·9	1·8957	1·9	2·0749	0·9	2·3656	0·09	3·1214
40	0·2533	4·6	1·6849	2·8	1·9110	1·8	2·0969	0·8	2·4089	0·08	3·1559
35	0·3853	4·4	1·7060	2·7	1·9268	1·7	2·1201	0·7	2·4573	0·07	3·1947
30	0·5244	4·2	1·7279	2·6	1·9431	1·6	2·1444	0·6	2·5121	0·06	3·2389
25	0·6745	4·0	1·7507	2·5	1·9600	1·5	2·1701	0·5	2·5758	0·05	3·2905
20	0·8416	3·8	1·7744	2·4	1·9774	1·4	2·1973	0·4	2·6521	0·01	3·7190
15	1·0364	3·6	1·7991	2·3	1·9954	1·3	2·2262	0·3	2·7478	0·005	3·8906
10	1·2816	3·4	1·8250	2·2	2·0141	1·2	2·2571	0·2	2·8782	0·001	4·2649
5	1·6449	3·2	1·8522	2·1	2·0335	1·1	2·2904	0·1	3·0902	0·0005	4·4172

TABLE 10. PERCENTAGE POINTS OF THE t-DISTRIBUTION

This table gives percentage points $t_\nu(P)$ defined by the equation

$$\frac{P}{100} = \frac{1}{\sqrt{\nu\pi}} \frac{\Gamma(\frac{1}{2}\nu+\frac{1}{2})}{\Gamma(\frac{1}{2}\nu)} \int_{t_\nu(P)}^{\infty} \frac{dt}{(1+t^2/\nu)^{\frac{1}{2}(\nu+1)}},$$

Let X_1 and X_2 be independent random variables having a normal distribution with zero mean and unit variance and a χ^2-distribution with ν degrees of freedom respectively; then $t = X_1/\sqrt{X_2/\nu}$ has Student's t-distribution with ν degrees of freedom, and the probability that $t \geqslant t_\nu(P)$ is $P/100$. The lower percentage points are given by symmetry as $-t_\nu(P)$, and the probability that $|t| \geqslant t_\nu(P)$ is $2P/100$.



The limiting distribution of t as ν tends to infinity is the normal distribution with zero mean and unit variance. When ν is large interpolation in ν should be harmonic.

P	40	30	25	20	15	10	5	2·5	1	0·5	0·1	0·05
$\nu = 1$	0·3249	0·7265	1·0000	1·3764	1·963	3·078	6·314	12·71	31·82	63·66	318·3	636·6
2	0·2887	0·6172	0·8165	1·0607	1·386	1·886	2·920	4·303	6·965	9·925	22·33	31·60
3	0·2767	0·5844	0·7649	0·9785	1·250	1·638	2·353	3·182	4·541	5·841	10·21	12·92
4	0·2707	0·5686	0·7407	0·9410	1·190	1·533	2·132	2·776	3·747	4·604	7·173	8·610
5	0·2672	0·5594	0·7267	0·9195	1·156	1·476	2·015	2·571	3·365	4·032	5·89;	6·869
6	0·2648	0·5534	0·7176	0·9057	1·134	1·440	1·943	2·447	3·143	3·707	5·208	5·959
7	0·2632	0·5491	0·7111	0·8960	1·119	1·415	1·895	2·365	2·998	3·499	4·78;	5·408
8	0·2619	0·5459	0·7064	0·8889	1·108	1·397	1·860	2·306	2·896	3·355	4·50	5·041
9	0·2610	0·5435	0·7027	0·8834	1·100	1·383	1·833	2·262	2·821	3·250	4·29	4·781
10	0·2602	0·5415	0·6998	0·8791	1·093	1·372	1·812	2·228	2·764	3·169	4·144	4·587
11	0·2596	0·5399	0·6974	0·8755	1·088	1·363	1·796	2·201	2·718	3·106	4·02	4·437
12	0·2590	0·5386	0·6955	0·8726	1·083	1·356	1·782	2·179	2·681	3·055	3·93	4·318
13	0·2586	0·5375	0·6938	0·8702	1·079	1·350	1·771	2·160	2·650	3·012	3·85	4·221
14	0·2582	0·5366	0·6924	0·8681	1·076	1·345	1·761	2·145	2·624	2·977	3·78	4·140
15	0·2579	0·5357	0·6912	0·8662	1·074	1·341	1·753	2·131	2·602	2·947	3·73	4·073
16	0·2576	0·5350	0·6901	0·8647	1·071	1·337	1·746	2·120	2·583	2·921	3·68	4·015
17	0·2573	0·5344	0·6892	0·8633	1·069	1·333	1·740	2·110	2·567	2·898	3·64	3·965
18	0·2571	0·5338	0·6884	0·8620	1·067	1·330	1·734	2·101	2·552	2·878	3·61	3·922
19	0·2569	0·5333	0·6876	0·8610	1·066	1·328	1·729	2·093	2·539	2·861	3·57	3·883
20	0·2567	0·5329	0·6870	0·8600	1·064	1·325	1·725	2·086	2·528	2·845	3·552	3·850
21	0·2566	0·5325	0·6864	0·8591	1·063	1·323	1·721	2·080	2·518	2·831	3·527	3·819
22	0·2564	0·5321	0·6858	0·8583	1·061	1·321	1·717	2·074	2·508	2·819	3·505	3·792
23	0·2563	0·5317	0·6853	0·8575	1·060	1·319	1·714	2·069	2·500	2·807	3·485	3·768
24	0·2562	0·5314	0·6848	0·8569	1·059	1·318	1·711	2·064	2·492	2·797	3·467	3·745
25	0·2561	0·5312	0·6844	0·8562	1·058	1·316	1·708	2·060	2·485	2·787	3·450	3·725
26	0·2560	0·5309	0·6840	0·8557	1·058	1·315	1·706	2·056	2·479	2·779	3·435	3·707
27	0·2559	0·5306	0·6837	0·8551	1·057	1·314	1·703	2·052	2·473	2·771	3·421	3·690
28	0·2558	0·5304	0·6834	0·8546	1·056	1·313	1·701	2·048	2·467	2·763	3·408	3·674
29	0·2557	0·5302	0·6830	0·8542	1·055	1·311	1·699	2·045	2·462	2·756	3·396	3·659
30	0·2556	0·5300	0·6828	0·8538	1·055	1·310	1·697	2·042	2·457	2·750	3·385	3·646
32	0·2555	0·5297	0·6822	0·8530	1·054	1·309	1·694	2·037	2·449	2·738	3·365	3·622
34	0·2553	0·5294	0·6818	0·8523	1·052	1·307	1·691	2·032	2·441	2·728	3·348	3·601
36	0·2552	0·5291	0·6814	0·8517	1·052	1·306	1·688	2·028	2·434	2·719	3·333	3·582
38	0·2551	0·5288	0·6810	0·8512	1·051	1·304	1·686	2·024	2·429	2·712	3·319	3·566
40	0·2550	0·5286	0·6807	0·8507	1·050	1·303	1·684	2·021	2·423	2·704	3·307	3·551
50	0·2547	0·5278	0·6794	0·8489	1·047	1·299	1·676	2·009	2·403	2·678	3·261	3·496
60	0·2545	0·5272	0·6786	0·8477	1·045	1·296	1·671	2·000	2·390	2·660	3·232	3·460
120	0·2539	0·5258	0·6765	0·8446	1·041	1·289	1·658	1·980	2·358	2·617	3·160	3·373
∞	0·2533	0·5244	0·6745	0·8416	1·036	1·282	1·645	1·960	2·326	2·576	3·090	3·291